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Analysis of the Relationship Between Soybeans Farmers' Level of Education and their Coping Strategies to Climate Change in the North-East Nigeria

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Abstract: The study was conducted to analyze the relationship between educational level and coping strategies adopted by soybean farmers in response to climate change in the North East Nigeria. Multi-stage random sampling technique was used to sample respondents while primary and secondary data were used for the study. A well-structured questionnaire was used to collect data from 450 soybean farmers. Descriptive and inferential statistical tools were used to achieve the objectives. The socioeconomic characteristics of the farmers indicated that majority (67.3%) were male and are between 41-50 years of age, majority (66.9%) were married with a household size of 1-5 persons and a farming experience of 16 years and above. Most of the farmers had one form of formal education or another, while 57.8% of the farmers cultivated between 1-5 hectares of farm land. Majority (60.0%) of the farmers belongs to one agricultural association or another. Pearson's Chi Square (X^2) test of association was used to test the relationship.The result showed that the Pearson Chi Square value for the relationship was 9.792 while the p-value was 0.044. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area.The result shows that there was no significant relationship between level of education and participating in government intervention that provides fertilizer and improved soybean seed to farmers.In conclusion,farmer'saccess to all the variables that positively influence the cultivation of soybeanwill help in the adoption of coping strategies in the face of climate change and it is recommended that the government should collaborate with traditional rulers, youths and other stakeholders in the community to provide adequate security of life and properties.

Keywords: *Analysis, Relationship, Coping, Strategies, Response, Climate, Change*

I. INTRODUCTION

Nigeria is not an exception to the rule that climate stressors are already present on the African continent, which makes it particularly vulnerable to the effects of climate change. More than one third of Africans already live in drought/flood-prone areas and that 220 million are exposed to drought each year and numerous variables may make the effects of the existing climate variability in Africa, and Nigeria in particular, worse, which could negatively affect the ability of the continent to adapt to and withstand climate change (Abdulkadir, Maryam and Muhammed, 2017). The effects could range from poverty to illiteracy and a lack of skilled workers to weak institutions, poor infrastructure, a lack of technology and knowledge, poor access to resources, poor managerial abilities, and armed conflicts. The misuse of natural resources for human activities including population expansion, desertification, and land degradation brings new issues and hazards to Africa, particularly Nigeria. In the Sahara and the Sahel, people's quality of life, agriculture, and health suffer greatly from dust, heat, and sand storms (Nzeh, Uke, Attamah, Nzeh, and Agu, 2016)

Climate alter is causing expanding temperatures, desertification, ocean level rise, dry seasons, low precipitation, flooding, land degradation, extraordinary climate condition occurring as frequent as possible, and waning freshwater resources. These issues are right now affecting Africa, especially Nigeria (Elisha, Sawa, Ejeh and Lawrence, 2017). Due to climate change, ranchers cannot foresee the lengths and power of precipitation, and impressive runoff and flooding that happened in different regions of Nigeria. A diminish in precipitation in Nigeria is driving to an expanded recurrence of serious dry spells that influence both human, animal and plants (Olaniyi, 2019).

The only way to close the knowledge gap between Africa's truly developed and impoverished nations is for stakeholders and farmers in particular, to share information with one another. Actors and stakeholders are trying to close this gap in many African nations, but it is difficult because of the extent of corruption. Nigerians have long relied on knowledge, communication, and information sharing to make decisions about what to grow, when to plant it, how to cultivate and harvest it, where to store and sell it, and at what price to sell it. Unfortunately, these decisions are sometimes made badly because of vested interests (Emad, Zeinab, and Ali, 2018). One area where ICTs can have a big influence on people is the delivery of agricultural extension services, which mostly depend on information sharing between farmers and other sector participants. Around the world, traditional civilizations as we know them are evolving into knowledge-based society, doing away with the concept of "illiterate rural communities," Antiquated methods of offering crucial services to the public are no longer able to produce the intended outcomes, (Meera, Jhamtani, and Rao, 2021).

Coping entails facing and handling obligations, issues, or challenges, particularly in a composed and sufficient manner. It also entails struggling and handling unfairly harsh situations or achieving some degree of success (Simpson, 2014). The term "coping" describes the mental and physical strategies used to address certain external and/or internal demands that a person perceives as burdensome or beyond their capacity. While strategy is the art and science of organizing resources for the most effective and efficient use, it is also a technique or plan adopted to bring about a desired feature, such as the accomplishment of a goal or a solution to a problem (Oxford Dictionary, 2014). Coping techniques are defined as responses or actions taken to control, lessen, or endure the demands

imposed by stress (Weiten *et al.* 2011). Hence, a coping strategy is an intentional attempt to resolve a personal or social issue in order to reduce, eliminate, or tolerate stress or conflict (Lazarus 1993). Coping mechanisms can differ between people and between situations. This is to say that the ability of people to break out of poverty or adopt a coping mechanism is often associated with the peculiarities of the conditions within their communities. Coping techniques relate to immediate responses to shocks, such climate change, as opposed to adaptation, which is a long-term response to stressors. Households often rotate crop fields annually, plant crops at the appropriate time based on rainfall intensity, mix crop species, choose crop varieties based on adaptation, and utilize water collection systems to deal with rainfall unpredictability (Alemayehu and Bewket, 2017).

Soybean is a leguminous vegetable belonging to the pea family that can be grown in temperate, tropical, and subtropical regions. The crop was domesticated in northeast of China, about the eleventh century BC. It is thought that Chinese traders along Africa's east coast may have brought it to the continent in the 1800s. Soybean may be successfully farmed in many areas of Nigeria with less agricultural input because of better technologies. Soybean farming has increased because of its economic importance, range of domestic uses, and nutritional advantages for both human and industrial use and also it is a sizable provider of vegetable oil on the international market. By dry mass, soybean seeds contain 20% oil that is 85% unsaturated and cholesterol-free. Soybeans are more protein-rich than any other vegetable or animal food source found in Nigeria, with an average protein level of 40% (Dugje, Omoigui, Ekeleme, Bandyopadhyay, Kumar and Kamara, 2019). As more farmers and other stakeholders become aware of the potential of this crop, not only for money/food, but also for improving soil fertility, soybean planting and output has risen and farmers are utilizing the expanding soybean market to increase output, processing, and distribution. Considering the research on coping strategies and climate change reviewed from other researcher's report, this research on the analysis of coping strategies adopted by soybean farmers in response to climate change become important.

The broad objective of the study is to analyze the coping strategies of soybean farmers in response to climate change. The specific objective of the study is to;

i. describe the socioeconomic characteristic of soybean farmers in the study area
ii. there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area

II. MATERIALS AND METHODS

A. Study area

The North East is one of the six geopolitical zones of Nigeria representing both a geographic and political region of the country. It comprises six States Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe.In recent years, climate change in the region has begun to be more evident. Tropical wet and dry weather prevails in States. The wet season lasts from April to October, whereas the dry season lasts for at least five months (November to March) yearly. An upsurge in rainfall in September in recent years is usually accompanied by floods with many people losing their lives and properties due to both discharge of water from the Lagoo Dam in Cameroon and severe rainfall. The primary livelihood of the local population centers on agriculture, evident in their distinct vegetation regions, namely the sub-Sudan and Northern Guinea Savannah Zones. They cultivate cash crops like cotton and groundnuts, alongside food staples such as maize, yam, cassava, guinea corn, soybean, millet, and rice. Communities residing along riverbanks are involved in fishing, and the Fulani people are known for cattle herding.(Hassan, Ademu, and Muhammed, 2023).

B. Data collection

A structured questionnaire was used to collect data from the respondents. The ADP extension agents who administered the questionnaire were academically qualified with wealth of experiences in administration of questionnaire and good knowledge of the local languages. Both male and female enumerators where used to ensure good coverage of male and female farmers and quality work. The instrument, (questionnaire) has both face validity and content validity. The instrument was given to extension experts in the department of Agricultural Extension and Rural Sociology. Observations and corrections made were affected.

C. Methods of data analysis

Descriptive and inferential statistical tools were utilized to analyze the data. Objective 1 was analyzed using simple descriptive statistics like mean, frequency and percentage while objective 2 were achieved using The Pearson's Chi Square (X^2) test of association

The test statistic for the Chi-Square Test of Independence is denoted X^2, and is

Computed as:

$$\chi 2=\sum i=1R\sum j=1C\ (o_{ij}-e_{ij})^2/e_{ij}$$

Where:

o_{ij} is the observed cell count in the i^{th} row and j^{th} column of the table
e_{ij} is the expected cell count in the i^{th} row and j^{th} column of the table,

Computed as

$$e_{ij}=\text{row i total x col j total/grand total}$$

The quantity (o_{ij} - e_{ij}) is sometimes referred to as the *residual* of cell (i, j), denoted rij.

The calculated X^2 value is then compared to the critical value from the X^2 distribution table with degrees of freedom df = (R - 1) (C - 1) and chosen confidence level. If the calculated X^2 value > critical X^2 value, then we reject the null hypothesis.

III. RESULTS AND DISCUSSION

A. Socioeconomic Characteristics of the Soybean Farmers

Table 3.1 shows the distribution of respondents by their socioeconomic characteristics among soybean farmers in the study area. The table 3.1 revealed that most (33.8%) of the respondents where between the age group of 41-50 years, while 29.6% of the respondents fell between age group of 31-40 years. Only 15.8% of respondents were 51 years and above. This implies that majority of the soybean farmers in the study area were within the active and productive age group and were young, strong and agile and economically active, thus capable of coping with many activities to make a living. This result agreed with Alim *et al.*, (2022) who stated that farming population with such age group are better risk manager and has the ability to cope in the face of hash weather condition. Alim

et al., (2022), further stated that age of farmers can significantly affect their productivity.

The gender (sex) of the soybean farmers in the study area revealed that majority (67.3%) of the respondent sampled were males while 32.7% were females. The nature of soybean production makes it male dominated in the study area, because it is capital intensive, energy demanding, physical and emotional stability including high ability to adapt to climate change. Climate change adaptation strategies like multiple crop varieties, land fragmentation, multiple planting dates, crop diversification, off-farm employment and cover cropping are majorly managed by the male farmers. Also, Osman *et al.* (2018) stated that soybean farming in Northern Region of Ghana is majorly dominated by male farmers due to the drudgery nature of the crop. Ayalew, Bekele and Mazengla (2018) reported that most soybean farmers in Pawe District North Western Ethiopia are male headed households who have the strength to withstand climate change indicators.

The result of marital status of soybean farmers presented in Table 3.1 indicated that majority (66.9%) of the respondents were married, 22. 7% were single, 6.0% were divorced and only 4.4% were widows/widowers. The implication of the finding is that majority of the soybean farmers in the study area might prefers to cultivate soybean as married person due to the energy intensive nature of cultivating and harvesting soybean because family members will provide extra work force when compared to single farmers who may be working alone. The finding is almost in consonance with that of Tony,*et al.* (2022) who revealed that agricultural adaptation strategies to climate change impacts in Africa require responsible farmers who are matured and responsible enough to take serious decisions concerning their crop productivity and survival. Also, Upev *et al.* (2015) stated that majority of farmers who are young and married has a high impact on the productivity and yield of the farm products.

Table 3.1 revealed the household size distribution of soybean farmers in North East Region of Nigeria. The results showed that majority (62.9%) had a household size of 1-5 persons while most (36.7%) had a household size of 6-10 persons and few (0.4%) had household size of 11 and above persons. Coping with climate change is often difficult in underdeveloped countries because socioeconomic, geographical, and meteorological variables influence adaptability (Omerkhil et al., 2020). The youths have left the rural area to urban area in search of white-collar jobs and a better life. This result is in disconformity with the opinion by Ayalew, Bekele and Mazengla (2018) who reported that large family size is meant to support family farming activities.

The educational status of soybean farmers indicated that 36.2 % had OND, and NCE qualification, 34.4 % had secondary school qualification, 15.3% had BSc and HND qualification while 10.7 % and 3.3 % had primary school qualification and no formal school at all. The above result shows that majority of the soybeans farmers can read and write and this is an advantage to the adoption of coping strategies posed by climate change variation in the study area. Information comprehension and risk management will be easy because of the farmer's ability to read and understand information quickly. Extension message should be packaged and delivered to the farmers in the best method that farmers can understand and adopt. Most information in this age is packaged either in soft copy or hard copy that will require the receiver to read and interprets for him-self. Vulnerability assessments must take into account and address a number of important issues. These problems include the insufficiency of current assessments in terms of supporting decision-making, the ambiguity surrounding the operationalization of the vulnerability, the lack of standardization in vulnerability measures, and the inadequate consideration given to indigenous knowledge and experience (Onyeneke, *et al.,* 2020).

The farm size cultivated by soybean farmers in the study area as shown in Table 3.1 indicated that 57.8% of the respondents cultivated between 1-5 hectares of farm land while 42.2 % of the respondents cultivated above 6 hectares of farm land. The result shown in Table 4.1indicated that farmers in North East are small scale farmers that practice agricultural production of soybean on a small scale because of poor access to farm inputs and unpredicted climate change in the area. The result in Table 3.1 agreed with Federal Ministry of Environment (2015); Gabriel,(2023) that farmers may be raising their yields by cultivating larger areas of land, but doing so indirectly increases the amount of land used for agricultural purposes, which raises their risks and exposes them to the effects of climate change.

Years of practicing soybean production is the number of years each farmer has invested into cultivating soybean in the study area. The result in Table 3.1 indicated that 51.6% of the respondents had 16 years and above in cultivating soybean, 28.0 % of the respondents had between 5-10 years of experience while 20.4 % of the respondents had between 11-15 years of farming experience. The result is supported by Dossah and Mohammed (2016) who stated that the more time and years an individual spent on a given assignment or business the better the individual will or may become on that given assignment. The soybean farmers have indigenous knowledge due to the many years of cultivating this particular crop

Membership of cooperative society shown in Table 3.1 revealed that majority (60.0%) of the respondents belong to one form of agricultural cooperative or another. While many (40%) of the respondents did not. Belonging to an agricultural cooperative as a farmer has great advantage because it makes it easy for information circulation, access to government intervention, access to loan, and training and leadership skills. Many interventions by non-government organization and other stakeholders mostly pass through cooperative societies and association. So as a member you stand a chance to benefit from such project and programs.

Access to extension agents result in Table 3.1 indicated that majority (61.8%) has access to extension agents while few (38.2%) had no access to extension agent in the study area. Farmers having access to extension agents is a great advantage because it enables the farmers to interact with the agents and get current information on innovation and technology relevant to the growth and production of agricultural products. It also gives opportunity to the farmers to inform the extension agents on any problems faced in his or her farming activities especially as it relates to soybean production. The result is in consonant with Ajayi (2016) who stated that extension agents created awareness on the effect of climate change on arable crops in rural area of Kaduna State Nigeria. The important of extension agents can-not be over emphasized in the overall activities in agriculture. Rural farmers will keep suffering in ignorance and poor knowledge on the current innovation and technology available in agricultural without good extension activities. It is therefore remarkable for the majority of farmers in the study area who have access to extension agents.

Access to credit facilities in the study area shown in table 3.1 revealed that majority (65.1%) had no access to credit facility

while only few (34.9%) had access to credit facility. This has a great implication on soybean production in the study area knowing fully that soybean production required much capital at every stage of production. Expansion of farm land and increase in production of goods and services become very difficult since the farmers can-not access credit facility of any kind like the bank, and cooperative society etc. the result agreed with Aminu *et al.,* (2019) who stated that major constraints of rural farmers is access to loan and financial risk management in agricultural productivity. Farmers are incapacitated in carrying out major or minor agricultural production or activities when they lack finances to do such.

Table 3.1 indicated farmer's access to land for soybean production. Majority (50.0%) of the soybean farmers inherited the farm land they used for soybean production, while few (14.2%) farmers used family land for soybean production. The land tenure system in operation in the study area can be responsible for the ways soybean farmer's access land for cultivation. The finding of Alim *et al.,* (2022) who stated that risk coping strategies among small scale soybean farmers in Kaduna State, Nigeria is so much that the bureaucracy involved in land allocation weight most farmers down from seeking approval for government land. Signing of certificate of occupancy of land in the state can take government two to three years because of political interest and other reasons which are not in favor of small-scale farmers in the communities.

Table 3.1: Distribution of Respondents by their Socio-economic Characteristics

Socioeconomic Variables	Frequency	Percent
Age		
20-30	94	20.9
31-40	133	29.6
41-50	152	33.8
51 above	71	15.8
Gender		
Female	147	32.7
Male	303	67.3
Marital Status		
Single	102	22.7
Married	301	66.9
Divorced	27	6.0
Widow	20	4.4
Household Size		
1-5	283	62.9
6-10	165	36.7
11 above	2	.4
Educational Level		
No formal education	15	3.3
Primary School	48	10.7
Secondary School	155	34.4
HSC/OND/NCE	163	36.2
BSc/HND	69	15.3
Farm Size		
Above 6	190	42.2
1-5	260	57.8
Years of Practicing Soybean Production		
5-10	126	28.0
11-15	92	20.4
16 above	232	51.6
Membership of cooperative Society		
Non-Members	180	40.0
Members	270	60.0
Access to Extension Agents		
No-Access	172	38.2
Access	278	61.8
Source of Land for Soybean Production		
Purchased the Land	39	8.7
Inherited Land	225	50.0
Communal Land	26	5.8
Leased (Rent) Land	42	9.3
Government Land Allocation	54	12.0
Family Land	64	14.2
Total	**450**	**100.0**

Source: Field Survey 2024

B. Level of education and participating in Government intervention that provides fertilizer and improved soybean seed to farmers

Table 3.2 shows the results of Pearson Chi Square test for the association between Level of education and participating in government intervention that provides fertilizer and improved soybean seed to farmers. The result showed that the Pearson Chi Square value for the relationship was 9.792 while the p-value was 0.044. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area. This was tested at 4% level of significance. The observed frequency in table 3.2 shows that 9 respondents out of 15 respondents are without any level of education and participated in government intervention that provides fertilizer and improved soybean seed to farmers, with 8.4 expected frequency. Moreso, the observed frequency in table 3.2 shows that 26 respondents out of 48 respondents are holders of primary educational certificate and participated in government intervention that provides fertilizer and improved soybean seed to farmers, with 27.0 expected frequency. Also, the observed frequency in table 3.2 shows that 102 respondents out of 155 respondents are holder of secondary educational certificate and participated in government intervention that provides fertilizer and improved soybean seed to farmers, with 87.1 expected frequency. Furthermore, the observed frequency in table 3.2 shows that 83 respondents out of 163 respondents are holder of NCE/OND educational certificate and participated in government intervention that provides fertilizer and improved soybean seed to farmers, with 91.6 expected frequency. Likewise, the observed frequency in table 3.2 shows that 33 respondents out of 69 respondents are holder of tertiary educational certificate and participated in government intervention that provides fertilizer and improved soybean seed to farmers, with 38.8 expected frequency. The result shows that there was no significant relationship between level of education and participating in government intervention that provides fertilizer and improved soybean seed to farmers. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 3.2 Level of education and Participating in Government intervention that provides fertilizer and improved soybean seed to farmers

Level of Education	Response	Participating in Government intervention that provides fertilizer and improved soybean seed to farmers		Row Total
		NO	YES	

	Observed frequency	6(3.0%)	9(3.6%)	
No Education				15
	Expected frequency	6.6	8.4	
Primary Education	Observed frequency	22(11.2%)	26(10.3%)	48
	Expected frequency	21.0	27.0	
Secondary Education	Observed frequency	53(26.9%)	102(40.3%)	155
	Expected frequency	67.9	87.1	
NCE/OND Education	Observed frequency	80(40.6%)	83(32.8%)	163
	Expected frequency	71.4	91.6	
Tertiary Education	Observed frequency	36(18.3%)	33(13.0%)	69
	Expected frequency	30.2	38.8	
Column Total		197	253	450

Pearson Chi-Square =9.792; DF =4; P-value = 0.044

Source: Field Survey 2024

C. Level of education and increase in use of organic manure

Revealed in Table 3.3 is the result of Pearson Chi Square test for the association between Level of education and increase in use of organic manure. The result showed that the Pearson Chi Square value for the relationship was 7.115 while the p-value was 0.130. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area. This was tested at 4% level of significance. The observed frequency in table 3.3 shows that 14 respondents out of 15 respondents are without any level of education but their increased in the use of organic manure, with 13.4 expected frequency. Similarly, the observed frequency in table 3.3 shows that 38 respondents out of 48 respondents are holders of primary educational certificate but their increased in the use of organic manure, with 42.8 expected frequency. In addition, theobserved frequency in table 3.3 showed that 143 respondents out of 155 respondents are holder of secondary educational certificate but their increased in the use of organic manure, with 138.1 expected frequency. Also, the observed frequency in table 3.3 shows that 146 respondents out of 163 respondents are holder of NCE/OND educational certificate but their increased in the use of organic manure, with 145.3 expected frequency. Likewise, the observed frequency in table 3.3 shows that 60 respondents out of 69 respondents are holder of tertiary educational certificate but their increased in the use of organic manure, with 61.5 expected frequency. The result shows that there was no significant relationship between level of education and increase in the use of organic manure. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 3.3 Level of education and Increase in Use of organic manure

Level of Education	Response	Increase in Use of organic manure		Row Total
		NO	YES	
No Education	Observed frequency	1(2.0%)	14(3.5%)	15
	Expected frequency	1.6	13.4	
Primary Education	Observed frequency	10(20.4%)	38(9.5%)	48
	Expected frequency	5.2	42.8	
Secondary Education	Observed frequency	12(24.5%)	143(35.7%)	155
	Expected frequency	16.9	138.1	
NCE/OND Education	Observed frequency	17(34.7%)	146(36.4%)	163
	Expected frequency	17.7	145.3	
Tertiary Education	Observed frequency	9(18.4%)	60(15.0%)	69
	Expected frequency	7.5	61.5	
Column Total		49	401	450

Pearson Chi-Square = 7.115; DF = 4; P-value = 0.130

Source: Field Survey 2024

D. Level of education and planting of pests and disease resistant/tolerant soybean varieties

Table 3.4 shows the results of Pearson Chi Square test for the association between Level of education and planting of pests and disease resistant/tolerant soybean varieties. The result showed that the Pearson Chi Square value for the relationship was 8.714 while the p-value was 0.069. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area. This was tested at 4% level of significance. The observed frequency in table 3.4 shows that 14 respondents out of 15 respondents are without any level of education but plant pests and disease resistant/tolerant soybean varieties, with 14.0 expected frequency. Also, the observed frequency in table 3.4 shows that 43 respondents out of 48 respondents are holders of primary educational certificate but plant pests and disease resistant/tolerant soybean varieties, with 44.8 expected frequency. Furthermore, the observed frequency in table 4.30 shows that 143 respondents out of 155 respondents are holder of secondary educational certificate but plant pests and disease resistant/tolerant soybean varieties, with 144.7 expected frequency. Correspondingly, the observed frequency in table 3.4 shows that 159 respondents out of 163 respondents are holder of NCE/OND educational certificate but plant pests and disease resistant/tolerant soybean varieties, with 153.1 expected frequency. Moreso, the observed frequency in table 3.4 shows that 61 respondents out of 69 respondents are holder of tertiary educational certificate but plant pests and disease resistant/tolerant soybean varieties, with 64.4 expected frequency. The result shows that there was no significant relationship between level of education and planting of pests and disease resistant/tolerant soybean varieties. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 3.4 Level of education and planting of pests and disease resistant/tolerant soybean varieties

Level of Education	Response	Planting of pests and disease resistant/tolerant soybean varieties		Row Total
		NO	YES	
No Education	Observed frequency	1(3.3%)	14(3.3%)	15
	Expected frequency	1.0	14.0	
Primary Education	Observed	5(16.7%)	43(10.2%)	48

Education	frequency			
	Expected frequency	3.2	44.8	
	Observed	12(40.0%)	143(34.0%)	155
Secondary Education	frequency			
	Expected frequency	10.3	144.7	
	Observed	4(13.3%)	159(37.9%)	163
NCE/OND Education	frequency			
	Expected frequency	10.9	152.1	
	Observed	8(26.7%)	61(14.5%)	69
Tertiary Education	frequency			
	Expected frequency	4.6	64.4	
Column Total		30	420	450

Pearson Chi-Square = 8.714; DF = 4; P-value = 0.069

Source: Field Survey 2024

E. Level of education and planting of other crops on the same farm land with soybean (multi-crop agriculture)

Table 3.5 shows the results of Pearson Chi Square test for the association between Level of education and planting of other crops on the same farm land with soybean (multi-crop agriculture). The result showed that the Pearson Chi Square value for the relationship was 18.722 while the p-value was 0.001. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area. This was tested at 4% level of significance. Theobserved frequency in table 3.5 shows that 14 respondents out of 15 respondents are without any level of education but plant other crops on the same farm land with soybean (multi-crop agriculture), with 13.6 expected frequency. Respectively, the observed frequency in table 3.5 shows that 44 respondents out of 48 respondents are holders of primary educational certificate but plant other crops on the same farm land with soybean (multi-crop agriculture), with 43.5 expected frequency. Likewise, the observed frequency in table 3.5 shows that 144 respondents out of 155 respondents are holder of secondary educational certificate but plant other crops on the same farm land with soybean (multi-crop agriculture), with 140.5 expected frequency. Correspondingly, the observed frequency in table 3.5 shows that 153 respondents out of 163 respondents are holder of NCE/OND educational certificate but plant other crops on the same farm land with soybean (multi-crop agriculture), with 147.8 expected frequency. Moreso, the observed frequency in table 3.5 shows that 53 respondents out of 69 respondents are holder of tertiary educational certificate but plant other crops on the same farm land with soybean (multi-crop agriculture), with 62.6 expected frequency. The result shows that there was no significant relationship between level of education and planting of other crops on the same farm land with soybean (multi-crop agriculture). Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 3.5 Level of education and Planting of other crops on the same farm land with soybean (multi-crop agriculture)

Level of Education	Response	Planting of other crops on the same farm land with soybean (multi-crop agriculture)		Row Total
		NO	YES	
No Education	Observed frequency	1(2.4%)	14(3.4%)	15
	Expected frequency	1.4	13.6	
Primary Education	Observed frequency	4(9.5%)	44(10.8%)	48
	Expected frequency	4.5	43.5	
Secondary Education	Observed frequency	11(26.2%)	144(35.3%)	155
	Expected frequency	14.5	140.5	
NCE/OND Education	Observed frequency	10(23.8%)	153(37.5%)	163
	Expected frequency	15.2	147.8	
Tertiary Education	Observed frequency	16(38.1%)	53(13.0%)	69
	Expected frequency	6.4	62.6	
Column Total		42	408	450

Pearson Chi-Square = 18.722; DF = 4 ; P-value = 0.001

Source: Field Survey 2024

F. Level of education and decrease in the use of chemical fertilizer

Table 3.6 shows the results of Pearson Chi Square test for the association between Level of education and decrease in the use of chemical fertilizer. The result showed that the Pearson Chi Square value for the relationship was 6.182 while the p-value was 0.186. This was used to test the hypothesis which states that there is no significant relationship between level of education of the respondents and coping strategies adopted by soybean farmers in the study area. This was tested at 4% level of significance. The observed frequency in table 3.6 shows that 13 respondents out of 15 respondents are without any level of education but decrease in the use of chemical fertilizer, with 13.4 expected frequency. Furthermore, the observed frequency in table 3.6 showed that 45 respondents out of 48 respondents are holders of primary educational certificate but decrease in the use of chemical fertilizer, with 42.8 expected frequency. Additionally, the observed frequency in table 3.6 shows that 139 respondents out of 155 respondents are holder of secondary educational certificate but decrease in the use of chemical fertilizer, with 138.1 expected frequency. Similarly, the observed frequency in table 3.6 shows that 148 respondents out of 163 respondents are holder of NCE/OND educational certificate but decrease in the use of chemical fertilizer, with 145.3 expected frequency. Likewise, the observed frequency in table 3.6 shows that 56 respondents out of 69 respondents are holder of tertiary educational certificate but decrease in the use of chemical fertilizer, with 61.5 expected frequency. The result shows that there was no significant relationship between level of education and decrease in the use of chemical fertilizer. Therefore, we accept the null hypothesis and reject the alternative hypothesis.

Table 3.6 Level of education and decrease in the use of chemical fertilizer

Level of Education	Response	Decrease in the use of chemical fertilizer		Row Total
		NO	YES	
No Education	Observed frequency	2(4.1%)	13(3.2%)	15
	Expected frequency	1.6	13.4	
Primary Education	Observed frequency	3(6.1%)	45(11.2%)	48

	Expected Frequency	5.2	42.8	
Secondary Education	Observed frequency	16(32.7%)	139(34.7%)	155
	Expected frequency	16.9	138.1	
NCE/OND Education	Observed frequency	15(30.6%)	148(36.9%)	163
	Expected frequency	17.7	145.3	
Tertiary Education	Observed frequency	13(26.5%)	56(14.0%)	69
	Expected frequency	7.5	61.5	
Column Total		49	401	450

Pearson Chi-Square = 6.182; DF = 4; P-value = 0.186

Source: Field Survey 2024

CONCLUSION

Based on the empirical evidence of the study, the following conclusion were drawn

The soybean farmers were young and in their productive age, majority had formal education with the ability to read and write. They were married with an average family size and majority belong to farmers association that enable them have access to extension agents. Most of the soybean farmers have been involved in soybean production for so many years therefore they are very experience in agricultural activities. The sources of financing their agricultural production are through personal saving and the source of farm land is through inheritance with no access credit facility.

It was further concluded that the relationship between farmers socioeconomic characteristics and farmers coping strategies were positively significant at five level. When the farmers have access to all the variables that positively influence the cultivation of soybean, the adoption of coping strategies in the face of climate change will not be difficult.

RECOMMENDATIONS

1. The Federal, States and Local Government authorities should build the capacity of the extension agents in the area of ICT utilization so that the extension agents can be able to code, decode, source, and train the rural farmers in effective use of ICT in the area of climate change and other environmental issues.
2. Federal government of Nigeria should take climate change challenges very seriously and formulate policies that can assist the farmers overcome its effect and build infrastructures in rural communities that can support the farmers efforts in the delivery of goods and services.
3. The government should collaborate with traditional rulers, youths and other stakeholders in the community to provide adequate security of life and properties. Farmers should be adequately protected both the farm land, family and communities, in that ways production of agricultural products and food security can be guarantee.

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